

### REMARKS

Claims 1-20 are all the claims presently pending in the application.

It is noted that Applicants specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1-20 stand rejected under 35 U.S.C. § 101 as allegedly directed to non-statutory subject matter.

Claims 16-19 stand rejected under 35 U.S.C. § 101 as allegedly being lacking utility because claim 16 is worded as being inoperable.

Claim 20 stands rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite.

Claim 9 is understood as standing rejected under 35 U.S.C. § 102(b) as allegedly anticipated by Liu et al., "Continual Queries for Internet Scale Event-Driven Information Delivery". Claims 1-4, 6, 7, and 10-15 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Liu, further in view of US Patent 5,915,251 to Burrows et al.

Claims 5, 8, and 16-20 are understood as being allowable over the prior art currently of record, if rewritten in independent format and the rejection for non-statutory subject matter is overcome.

These rejections are respectfully traversed in the following discussion.

#### **I. THE CLAIMED INVENTION**

As described and defined in, for example, independent claim 1, the present invention is directed to a method for monitoring continual range queries against events. Each range query is decomposed into one or more predefined virtual constructs. A query index is built, and the query index is used to match an event with the range queries.

The present invention provides a single event monitor for an event space that is accessible to a plurality of queries, including queries that will cause overlapping ranges in the monitor event region. No method is known to providing a fast matching of events against a large number of queries in such event monitors.

The present invention provides this fast matching for a plurality of queries by breaking each range query down into predefined regions of the monitored event space, referred to in the present invention as "virtual constructs", and providing an index mechanism to relate these virtual constructs to each query for which it had been constructed. This query index provides the fast matching that allows a single event monitor to service a plurality of queries in a plurality of dimensions.

Thus, the present invention is more than simply a mechanism involving continual queries. It is a mechanism that allows a single event space monitor to service many continual queries wherein a fast matching of an event can be reported to the appropriate queries.

As explained, beginning at line 19 on page 2 of the specification, until the present invention, it is been difficult to construct an effective index for multidimensional range predicates, particularly for overlapping ranges. As explained beginning at line 3 on page 3, the only mechanism known to the present inventors involves an R-tree method, and this method degrades when the spatial objects are highly overlapping.

In contrast, the present invention provides an indexing mechanism from the event monitor back to the various queries. This indexing feature is novel to the art of event monitors.

As explained below, the prior art rejection currently of record fails to address the monitoring of a plurality of queries, since the techniques of both these references involve the analysis of a single input query. There is no suggestion (and no need) in these prior art references of attempting to monitor a single event space for more than one input query, let alone input queries having overlapping objects.

## **II. THE 35 USC §101 REJECTIONS**

Claims 1-20 stand rejected under 35 U.S.C. §101, because, as best understood, the Examiner reconsiders that there is no "tangible result."

In the previous response, submitted on September 6, 2006, Applicants pointed out that the invention is described as being executed on a computer (e.g., a machine) and that such execution on a machine inherently provides a tangible result, since any stage in the execution of the process by a computer is measurable by one having ordinary skill in the art, including the final result of determining which queries are associated with a detected event and providing

indication of such query feedback.

On page 9 of the Office Action mailed on November 27, 2006, the Examiner responds: “... *the features upon which applicant relies (i.e., the execution of the method by a computer) are not recited in the rejected claim(s).*”

Applicants respectfully traverse this characterization, since the Examiner is required to interpret the claim language from the perspective of one having ordinary skill in the art, in view of the art as discussed in the disclosure. The disclosure clearly addresses a computerized method, so that one having ordinary skill in the art is a person having computer programming skills relative to monitoring continual range queries against events.

Therefore, in the sense that “tangible” means measurable by reason of being performed on a computer, Applicants submit that the wording of the independent claims is sufficient to establish “tangibility”, particularly for the apparatus and system claims 10-14.

Moreover, Applicants bring to the Examiner’s attention that “tangible” has taken on the meaning “real world application” in the new “Interim Guidelines”, as opposed to an abstract idea. Thus, Applicants submit that the method claims of 1-9 and 16-20 inherently deal with the “real world application” of monitoring continual queries against events and that there is no need to amend any of claims, even the method claims, to clarify this “real world application” aspect of the present invention.

Therefore, Applicants again submit that such an event monitor does indeed provide a “useful, concrete and tangible result”, and is completely analogous to the financial calculator invention of *State Street*.

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

The Examiner also rejects claims 16-19 as lacking utility because the Examiner considers that a one dimensional event space would lack “rectangles.” In response, Applicants direct the Examiner’s attention to the description at lines 14 – 17 of page 7, wherein Applicants specifically noted that the word “rectangle” is intended to mean a geometrical construct in dimensions other than merely two dimensional event spaces. The “rectangle” of a one-dimensional event space would be line segments. However, since a co-pending application separately addresses an embodiment of the present invention for the single-dimensional event

space, Applicants have amended claims 16-19 to clearly reflect that “rectangles” are intended to refer to constructs in event spaces having dimensions two or higher, in order to expedite prosecution.

In view of the above discussion and claim amendment, the Examiner is respectfully requested to reconsider and withdraw these rejections.

### III. THE INDEFINITENESS REJECTION

Claim 20 is rejected because the Examiner considers that one having ordinary skill in the art would not understand “... whether the set of working rectangles or the event space become progressively smaller in size.”

In response, Applicants direct the Examiner’s attention to the straightforward analysis of the grammatical construction of the final clause of this claim: “... *generating a set of working rectangles in an event space that become progressively smaller in size*” and point out that neither of the Examiner’s interpretations is incorrect, based upon the grammatical analysis.

Specifically, Applicants point out that the verb “become” in this clause is plural, thereby establishing that the subject of this clause, which is the pronoun “that”, must be referring to a plural noun, since normal English grammar requires agreement between the subject and verb and since pronouns are expected to take on the singular/plural aspect of the noun to which they refer. The only noun in the preceding clause that is plural is “rectangles”, thereby clearly establishing that the description relates to “rectangles” that become progressive smaller in size.

Therefore, contrary to the Examiner’s interpretations, this description is not referring to a “set ... that becomes progressive smaller in size” or an “event space ... that becomes progressively smaller in size”, as would be proper grammar construction for the two interpretations advanced by the Examiner in the rejection.

Moreover, Applicants submit that the expression “progressive smaller in size” has a plain meaning that entails no confusion to one having ordinary skill in the art, since this claim language is clearly describing that the “rectangles ... become progressively smaller in size.”

This feature of the present invention is clearly described in the specification.

Therefore, in view of the above discussion, Applicants submit that there is no

confusion about the plain meaning of the language of this claim and respectfully request that the Examiner reconsider and withdraw this rejection.

#### IV. THE PRIOR ART REJECTIONS

The Examiner continues to allege that Liu teaches the claimed invention described by claim 9 and, when, modified by Burrows, renders obvious claims 1-4, 6, 7, and 10-15. Applicants again submit, however, that there are elements of the claimed invention which are neither taught nor suggested by Liu or by Burrow and that the rejection currently of record fails to meet the initial burden of a *prima facie* rejection.

Applicants first reiterate that the two references used in the prior art rejection are non-analogous and, therefore, not properly combinable. That is, although primary reference Liu is reasonably related to the continual range monitoring environment of the present invention, secondary reference is related to querying a database. Moreover, the rejection currently of record fails to provide a proper motivation to combine these two references, since the rationale is merely a circular argument that basically recites the independent claim limitations. It is further noted that the combination is also improper because Burrows' word database search technique based on indexing uses a fundamentally different principle of operation from the continual query technique of Liu.

That is, queries and records are completely different entities and concepts. Queries are predicates or conditions used to find records that satisfy the predicates or conditions. Hence, indexing queries is conceptually very different from indexing records. In traditional database applications, records live and stay in the database, mostly for a very long time. Queries, on the other hand, are submitted by users dynamically and they stay active only a brief period of time until the results are found.

In the present invention, however, these characteristics are switched: queries are long running and stay active for a very long time while events/records exist only for a very brief period of time. The present invention indexes continual queries. It creates an index into a set of continual queries which last and stay active continuously. These long-lasting queries are used to continuously monitor incoming events. The goal is to find, with the help of the query index, all

the queries that match an incoming event, which can be viewed as a record. The present invention builds a query index by decomposing these queries into one or more predefined virtual constructs, which in the two-dimensional case comprises a set of virtual rectangles.

In contrast, Burrows is indexing records. Burrows creates an index into a set of records, each representing a Web page and each has a word and a numeric value. A query in Burrows contains one or more search keywords. The goal is to find all the Web pages containing those keywords. This is a typical search operation conducted by many users of the Web in the present time via a search engine provided by Google, Yahoo, or Microsoft on the Web.

Second, Applicants submit that the independent claims clearly require that the input query be range queries. The queries in Liu rely upon a defined threshold and are not range queries. The Examiner makes an attempt to overcome this basic deficiency of Liu by taking wording of the two references out of the context of the references themselves.

That is, taking claim 1 as an example, the Examiner relies upon the query parsing described at lines 57-67 of column 16 as satisfying the first claim limitation. However, Applicants submit that "parsing an input query into query components" fails to satisfy the plain meaning of the claim limitation that requires "... decomposing each range query into one or more predefined virtual constructs ...." Parsing transforms a user query, like searching "apple and orange", into a query tree, which is the AND operation of the result of searching "apple" and the result of searching "orange". The parsing of a user query in Burrows is not related to the decomposing of a continual range query into one or more virtual constructs. That is, parsing is understood in the art as translating a query into a sequence of operations. The decomposing step of the present invention partitions a range into one or more constructs.

In order to satisfy this claim language, the Examiner has the initial burden of first locating a range query in the prior art reference and demonstrating that this range query is decomposed into virtual constructs. The reliance upon "parsing" the query "(vegetables and fruit) and (not(cheese or apples))" is misplaced since this query is not a range query and because the resultant query components are not virtual constructs.

The Examiner also points to lines 34-35 of column 25 of Burrows. However, this description relates to dividing the word database, not a range query. A "range" query operation is described at lines 9-19 in column 26 and does not suggest decomposing the exemplary "range"

query "... find a word  $a$  in pages including 57 to 70 words ...." into some type of virtual constructs, let alone virtual constructs characterized by recently-added dependent claims 16-20.

Relative to the second claim limitation, the Examiner points to lines 16-23 of column 2 of Burrows. However, the description at these lines refer to indexing of range-based values of records within the word database and has nothing to do with a query index used to match an event in an event space. Burrows does not build a query index. Furthermore, Burrows has a word entry for each subinterval which includes the range-based values, and the locations associated with the word entries representing the subintervals are the locations of the range-based portions of information. Even if one can understand what this confusing sentence is about, it is still not remotely related to the query index disclosed in the present invention.

Relative to the final limitation, the Examiner points to Liu section 4.4.2. However, Applicants submit that there is no suggestion in this section concerning a query index. The Examiner also points to lines 53-55 of column 8 and lines 20-21 of column 25 of Burrows. Applicants submit that the description at both of these cited locations relate to size/date attributes of a page of records in the word database and have nothing to do with a query index set up to match events in an event space. The statement "... SIZE and DATE attributes can be searched in Burrows using range-based values" has nothing to do with the matching of an event with the range queries of the present invention. In the present invention, an event, represented as a record, is used to search the query index. Not only is the index in Burrows different from the query index of the present invention, but also the search operation is different.

Applicants submit that this "out-of-context" approach of the rejection for claim 1 fails to analyze the claim language as by one having ordinary skill in the art. Moreover, Applicants submit that the word database query technique in Burrows, as based on indexing the database, is completely non-related to the threshold query method of Liu. Even if Liu were to be combined with Burrows, as explained above, there is no suggestion of decomposing range queries into virtual constructs and building a query index to be used to match queries with events.

Hence, turning to the clear language of the claims, in Liu (or even Burrows) there is no suggestion or teaching of: "A method for monitoring continual range queries against events, said method comprising: decomposing each range query into one or more predefined virtual constructs; building a query index; and using said query index to match an event with said range

queries", as required by claim 1. The remaining independent claims, including claim 9, have similar language and are, therefore, also clearly patentable over Liu. That is, for the rejection for claim 9, the second claim limitation refers back to the description in the first limitation by reason of the antecedent basis for "the service", so that the method of "the service" of the second limitation is constrained by the definition of the first limitation.

Relative to the rejection for claim 2, Applicants submit that even though each query has a unique entity identifier, Liu does not maintain an identification list associated with a virtual construct. Liu does not have virtual constructs.

Relative to the rejection for claim 3, Applicants submit that the sentence "There is one word entry for each subinterval which includes the range-based ...." in Burrows is not related to the concept of this claim.

Relative to the rejection for claim 4, Applicants are puzzled why this line is even cited, since it does not appear to be relevant at all.

Relative to the rejection for claims 6 and 7, Applicants fail to find anything relevant in the cited lines from Liu.

In response to the Examiner's reliance, in paragraph ii.(1) on page 9 of the Office Action, upon the wording in the holding of *In re Keller*, Applicants suggest that the Examiner actually read this case before attempting to rely upon wording from case law wherein the facts are entirely different from those of the present evaluation. These words are not a generic denial of the right of Applicants to "attack reference individually", as this Examiner and many others attempt to apply them in Office Action responses. Rather, these words refer to the specific fact pattern in which the Examiner in that case cited two references and the affidavit of record in that case responded only to one of the two references, failing to even mention the second, more relevant, reference of that rejection.

Therefore, the wording in that holding merely states that the affidavit in that case should have included an analysis of the second applied reference, rather than merely attacking only the first and less significant reference. This wording does not, as this and many other Examiners assume, state a generic legal rule that references in a combination of references for an obviousness rejection are immune from comment from Applicants for any number of reasons.

Applicants submit that the Examiner has applied this wording from *In re Keller* outside



the context of the facts of that case and application of these words would be, therefore, incorrect both as a matter of law and as a matter of fact.

## V. FORMAL MATTERS AND CONCLUSION

The disclosure has been amended to address the Examiner's concern about label 605.

In view of the foregoing, Applicant submits that claims 1-20, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assignee's Deposit Account No. 50-0510.

Respectfully Submitted,



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### CERTIFICATION OF TRANSMISSION

I certify that I transmitted via EFS this Amendment under 37 CFR §1.116 to Examiner P. Kim on January 29, 2007.



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